

وحسب قديش صار انسداد بال Coronary بنقسم ال ACS

## 1□Chest pain without Necrosis

**وهل حالة بنسُميها ؟**

□□□□□□

□ 100% Obstruction

□ □ □ □ □ □ □ □ □ □ □ □ □ □

Type Of Myocardial Infarction ;

□Type 1: Spontaneous MI  
Atherosclerosis اللى هي سببها

□Type 2: MI Secondary to Ischemia imbalance rather than atherosclerosis

زي الاسباب اللي ذكرناها بالبوست الاول من ال IHD  
[https://t.me/l3lee\\_afeedk/1141](https://t.me/l3lee_afeedk/1141)

VISIT...

LANZAROTE  
*Caliente*.COM

بالاضافة لل severe anemia وال Shock وال Resp Failure

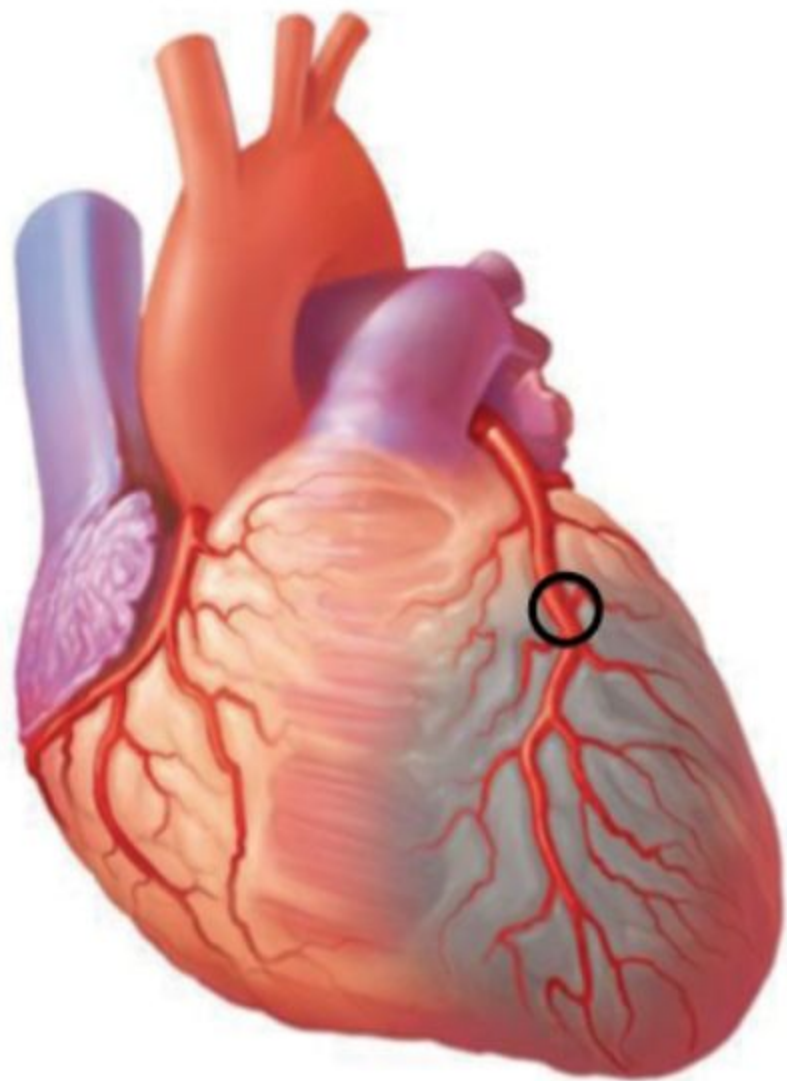
□Type 3: MI resulting in death without biomarker  
مريض اجا arrested بسبب ال MI وما انعمله Cardiac enzymes

□Type 4a: MI Related to PCI

□Type 4b: MI Related to stent thrombus

□Type 5: MI Related to CABG

#لعلي أفيدك ٤

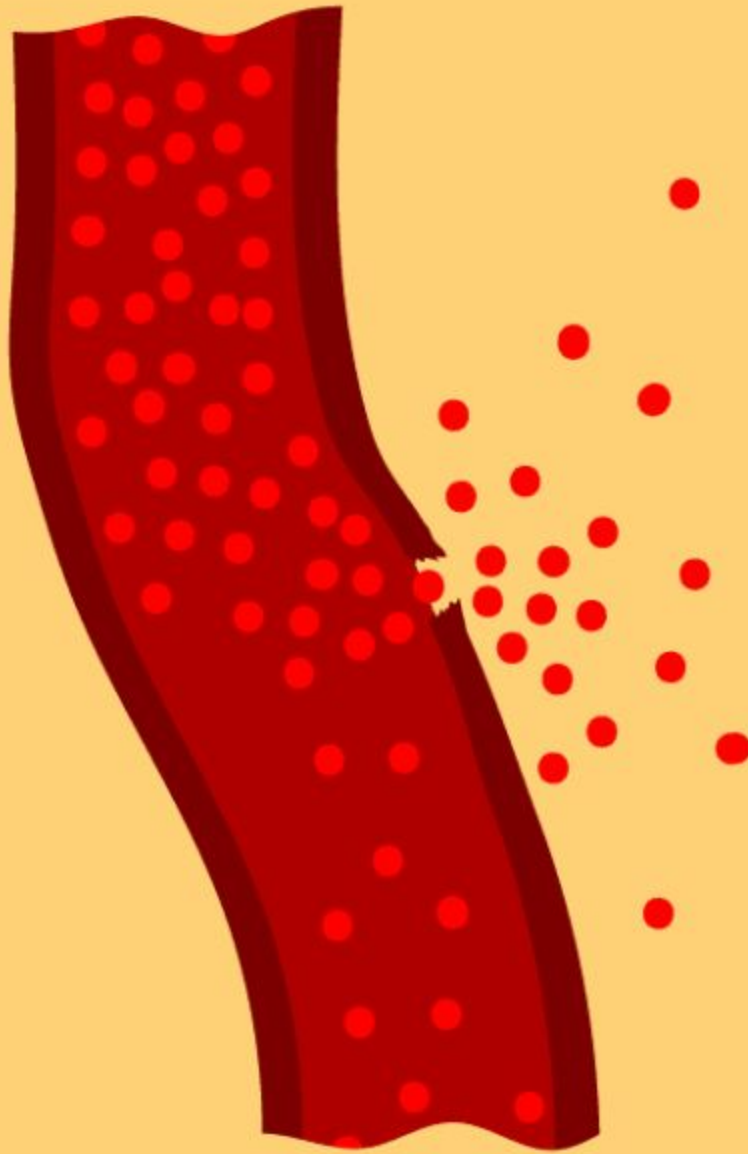


Plaque rupture/erosion with  
occlusive thrombus



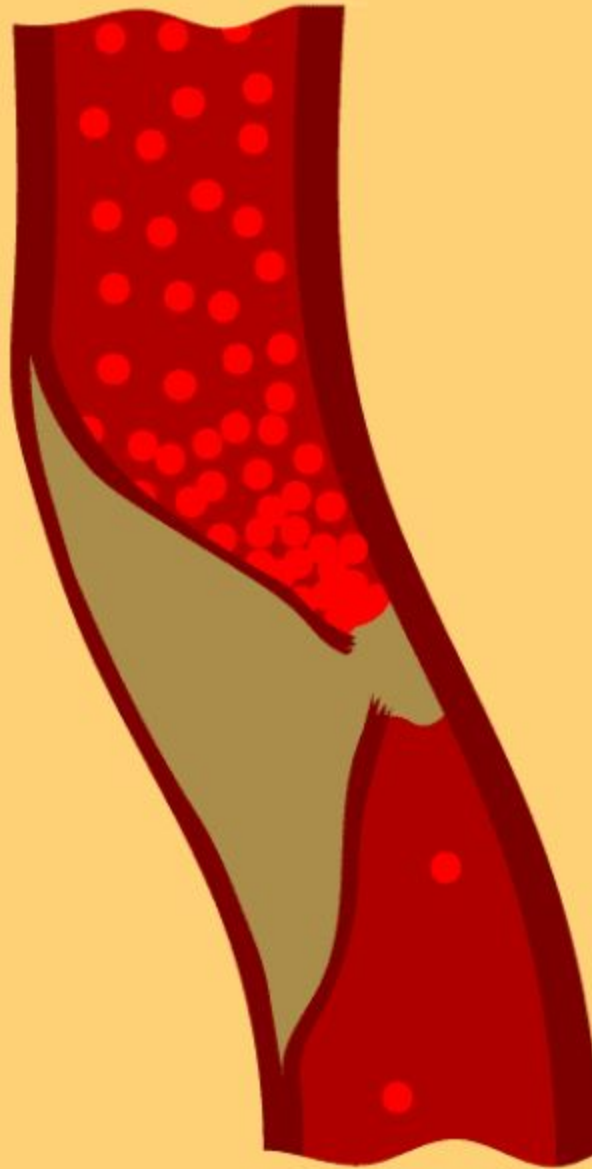
Plaque rupture/erosion with  
non-occlusive thrombus

# Types of Acute Coronary Syndrome



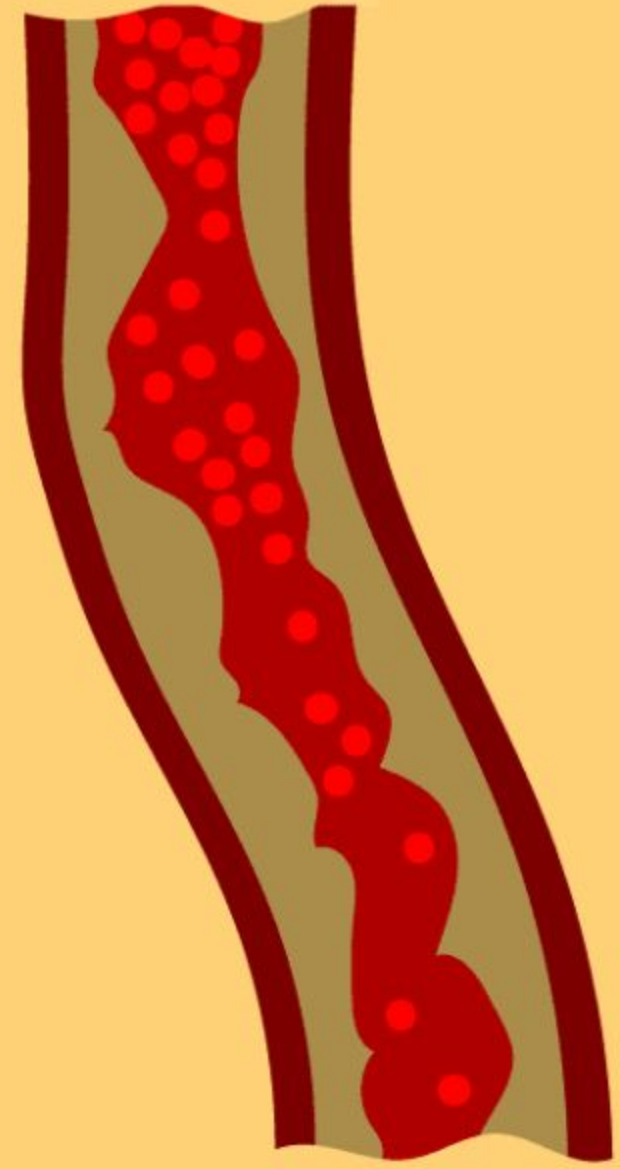
## Unstable angina

- partial rupture of an artery
- does not cause permanent damage to the heart



## STEMI

- “classic” heart attack
- causes extensive heart damage



## NSTEMI

- intermediate form of ACS
- causes less extensive damage to the heart

هدف العلاج لمريض ال STEMI انه نرجعه ال Coronary perfusion ونمنع ال Further Cardiac tissue Necrosis & MI complications وكل ما اجا المريض بدري وهو بال Acute phase كل ما كان أفضل

The established cornerstone of STEMI management is a combined strategy of:

ال Reperfusion إما بـ**مضيق بالقسطرة** PCI و**الأولوية** لل PCI  
أو بمذيبات **الحلطة** Fibrinolysin

AND

□Antithrombotic therapy - with dual antiplatelet therapy and anticoagulation.

أي مريض ACS سواء STEMI أو NSTEMI أو Unstable angia لازم ياخذ Single loading Dose aspirin ما لم يكن عنده aspirin hypersensitivity

aspirin: 300 mg orally (chewed or dispersed in water) as a loading dose

Make a clinical diagnosis of STEMI based on a combination of:  
Signs and symptoms of myocardial ischaemia, plus  
Persistent or increasing ST elevation on the ECG.

□First medical contact to ECG and STEMI diagnosis should take  $\leq 10$  minutes □

3 Immediately assess the patient's eligibility for coronary reperfusion therapy

بنحدد هل المريض يعمل PCI ولا يهاخذ Fibrinolysin

4□ Gain intravenous access and start continuous haemodynamic monitoring and pulse oximetry

When placing an intravenous cannula, avoid placing it in the right hand or right wrist area as the right radial artery is the usual route used to perform primary percutaneous coronary intervention

5□ Give pain relief

حسب ال ESC المريض هياخذ morphine sulfate او diamorphine

عشان يقلل ال pain ويثبط ال Sympathetic

□morphine sulfate 2.5 to 10 mg intravenously initially, followed by 2.5 to 10 mg if required (at a rate of 1-2 mg/minute)

□diamorphine: 2.5 to 5 mg intravenously initially, followed by 1.25 to 5 mg if required (at a rate of 1-2 mg/minute)

□ أما ال American ما يفضلو ال morphine Routine use of morphine

In patients with STEMI, we only use morphine to treat chest symptoms refractory to nitrates and other medical therapy; we suggest not to routinely administer morphine to all patients with STEMI

لان المورفين ما بيققل ال Mortality وبيققل ال effect لل

Antiplatelet ( P2Y12 Inhibitor )

6□ Give an anti-emetic concomitantly with the opioid analgesic to prevent the patient vomiting the oral loading dose of dual antiplatelet therapy.

□ondansetron: 4-8 mg intravenously as a single dose

Or

□metoclopramide body weight <60 kg: up to 500 micrograms/kg/day intravenously given in 3 divided doses; body weight ≥60 kg: 10 mg intravenously up to three times daily

Or

□cyclizine 50 mg intravenously three times daily

7□ Give oxygen therapy only if saturations are <90% on pulse oximetry

Routine supplemental oxygen is not indicated if arterial oxygen saturation (SaO<sub>2</sub>) ≥90%.

8□ Routine use of an intravenous nitrate in STEMI is not recommended as there is no evidence to support its benefits.

In practice, a sublingual (or buccal) dose is often given after a STEMI diagnosis has been made (and sometimes before the patient arrives at hospital)

المريض اللي هيستفيد على ال Nitrate I.V

□ لو المريض اخذ sublingual nitrate ولسه عنده Pain

□ في حالات ال Sustained HTN

□ لو كان مريض Heart Failure

□glyceryl trinitrate : 15-20 micrograms/minute intravenous infusion initially, adjust dose according to response, maximum 400 micrograms/minute

□isosorbide dinitrate: 2-10 mg/hour intravenous infusion initially, adjust dose according to response, maximum 20 mg/hour □Do not give an intravenous nitrate when there is:

□Hypotension secondary to right ventricular infarction (usually complicating an inferior or extensive anterior STEMI)

□Hypotension secondary to severe aortic stenosis or left ventricular outflow tract obstruction

□Hypotension secondary to pre-existing cardiomyopathy

□Persistent hypotension secondary to other causes

Use of a phosphodiesterase-5 inhibitor (e.g., avanafil, sildenafil, tadalafil, vardenafil) for erectile dysfunction within the last 48 hours

#لعللي أفيدك ؟





# STEMI: Diagnosis and Management

## 1. Diagnosis\*

New ST elevation in  $\geq 2$  contiguous leads, defined as:

In V2 or V3



Men < 40 years



Men > 40 years



Women

In other leads



Contiguous leads

Lateral: V4-V6

High lateral: I, aVL

Inferior: II, III, aVF

1 mm = 0.1 mV at standard calibration of 10 mm/mV

\*Note that the absence of these criteria do not rule out an acute MI or STEMI with an atypical ECG presentation.

## 2. Initial therapy

ASAP

Aspirin (chewable) — 162 - 325 mg



Oxygen, nitrates, analgesia if needed



P2Y12 inhibitor and IV anticoagulant  
Discuss timing re: PCI with cardiology



< 24H High-intensity statin therapy



Beta blocker

ACEI or ARB

Unless contraindicated  
(e.g. hypotension)



Do not use NSAIDs (except aspirin) for pain

## 3. Reperfusion therapy

For patients presenting within 12h of symptom onset

PCI hospital

PCI within 90 minutes  
of first medical contact

Non-PCI hospital

Can PCI be performed  
within 120 minutes?

No

Fibrinolysis  
within 30 mins

Yes

Arrange for  
urgent transport

Transfer to PCI-  
capable hospital

Thrombolysis pearls

- Triple-check for contraindications
- Consider  $\frac{1}{2}$  dose of TNK if  $\geq 75$  years old
- Clopidogrel is P2Y12 inhibitor of choice

Reperfusion: لو تم تشخيص مريض ال ACS على إنه STEMI هيكون قدامه احتماليين لل

1 إما يدخل قسطرة Primary PCI strategy

أو

2 ياخذ مذيب للجلطة "Thrombolytic" مبدئيا وبعدها يعمل PCI ...

فعالية ال Thrombolytic لحد 12hr من ال Pain onset

After 12hr There's No Role to Thrombolytic

According to ESC : After 3 hours (and up to 12 hours) of symptoms onset, the later the patient presents, the more consideration should be given to a primary PCI strategy as opposed to administering fibrinolytic therapy.

xxxxxxxxxxxxxxxxxxxxxxxx

بشكل عام الأولويه لل Reperfusion هي ال PCI

A primary PCI strategy is recommended over fibrinolysis within indicated timeframes.

If timely primary PCI cannot be performed timely after STEMI diagnosis, fibrinolytic therapy is recommended within 12 hours of symptom onset in patients without contraindications.

لاختيار طريقة ال Reperfusion عنا اربع سيناريوهات ...

1 مريض اتشخص STEMI بمستشفى متاح فيه primary PCI center

فالأولوية لل PCI خلال أقل من 60 دقيقة

Maximum time from STEMI diagnosis to wire crossing in patients presenting at primary PCI hospitals.

2 مريض وصل لمستشفى مفيهاش Primary PCI Center

وعشان أنقله لمكان فيه primary PCI هحتاج اقل من 120 دقيقة

فالخيار هيكون

Refer to primary PCI

ويفضل خلال أقل من 90 دقيقة يتقسطر

Maximum time from STEMI diagnosis to wire crossing in transferred patients. = <90 min

3 مريض وصل لمستشفى ما فيها primary PCI center وعشان يتنقل لمكان فيه primary PCI هحتاج اكر من 120 دقيقة

فالخيار هو ال Thrombolytic خلال 10 دقائق

□Maximum time from STEMI diagnosis to bolus or infusion start of fibrinolysis in patients unable to meet primary PCI target times =<10 min

4؟ لو المريض اجا متأخر 12-48hr ولسه فيه pain

□A routine primary PCI strategy should be considered in patients presenting late (12-48 hours) after symptom onset

اما لو احا بعد 48hr بدون وجود symptoms فال PCI هنا Not Indicated

□ In asymptomatic patients, routine PCI of an occluded IRA >48 hours after onset of STEMI is not indicated.

□ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □

ليس بعد ال Thrombolytic لازم يعمل المريض PCI

لأن الـ Thrombolytic يذيب جزء من الـ Thrombous ويضل  
Residual thrombus

الجزء الي بيضل بيعمل Thrombotic media وبيزود ال Tendency لتكبر ال thrombous , فمممكن يرجع يدخل المريض ب Re- Elevated ST

Thrombolytic milieu هادی المیکانزم بنسمیها

عشان هيك بعد ال (Thrombolytic Therapy(60-90min بينعمل assess للمريض هل ال Thrombolytic Therapy كان Successful ولا لأ

٤ لو صار Resolution لل ST Segment elevation بمقدار 50% او اكثر ،، معناها ال Thrombolytic كان successful وبنقل المريض لعمل Routine PCI خلال 2-24 ساعه

٤٠ لو ال Resolution لل ST segment elevation كان اقل من 50% معناها ال Thrombolytic Failed ولازم ينتقل المريض لعمل

Rescue PCI as soon as possible□

Source : ESC ,BMJ

## #لعلی أفیدك ؟



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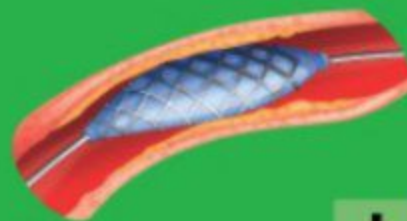
Symptoms onset

## Early phase of STEMI

3 hours

Primary PCI

I A

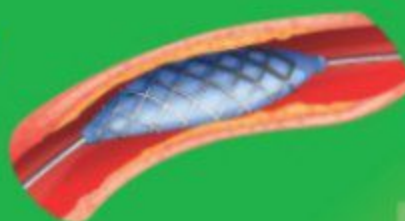


I A



Primary PCI

I A



I A



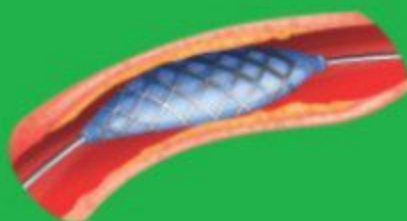
Fibrinolysis

(only if PCI cannot be performed within 120m from STEMI diagnosis)

12 hours

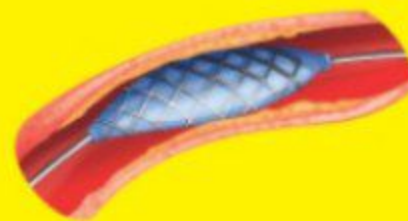
## Evolved STEMI

Primary PCI  
(if symptoms, hemodynamic instability, or arrhythmias)



I C

Primary PCI  
(asymptomatic stable patients)



IIa B

48 hours

## Recent STEMI

Routine PCI  
(asymptomatic stable patients)

III A

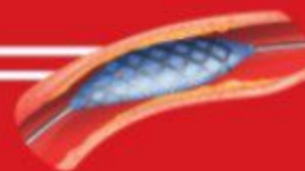
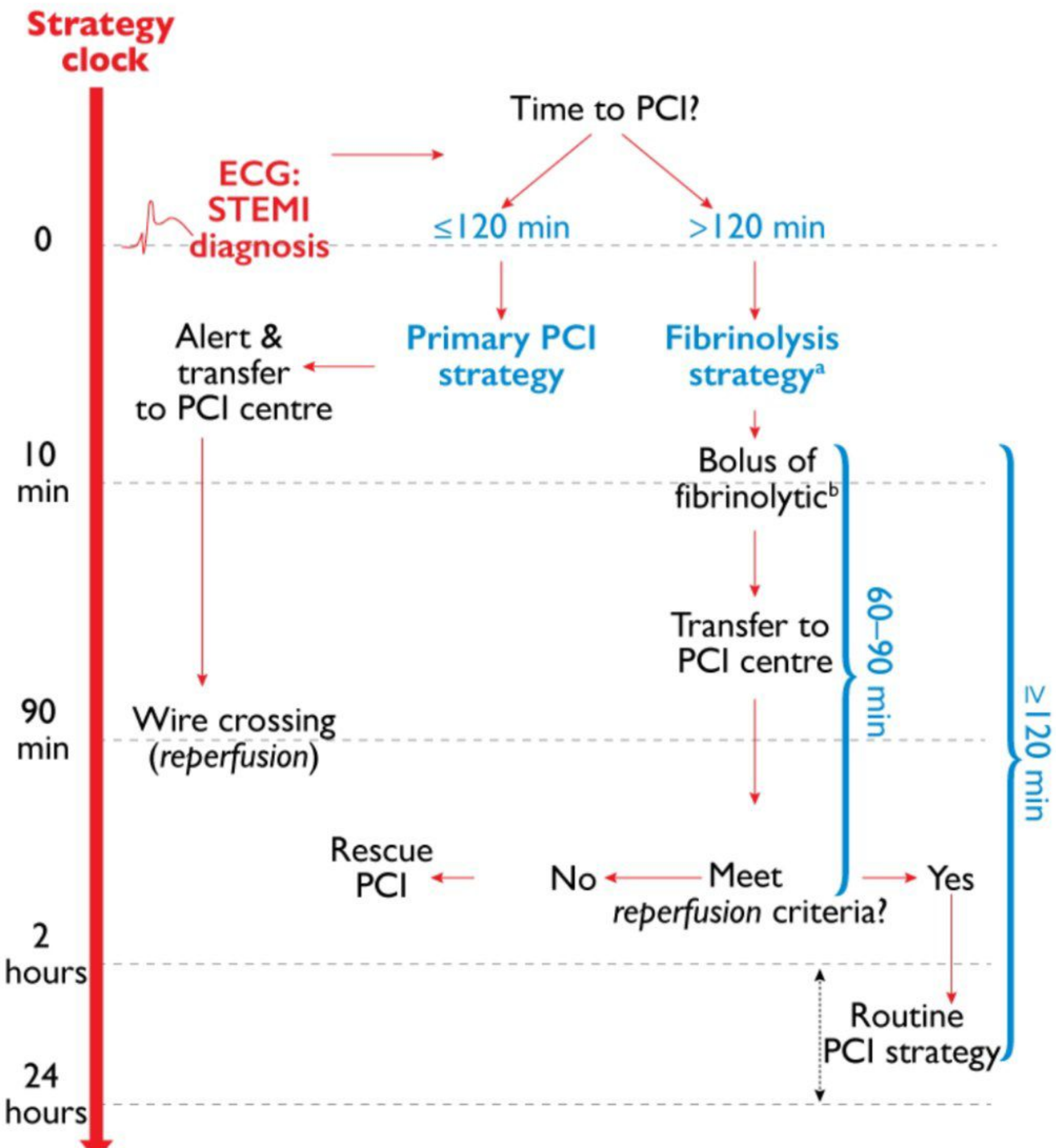


Figure 3 Maximum target times according to reperfusion strategy selection in patients presenting via EMS or in a non-PCI centre





**Table 5 Summary of important time targets**

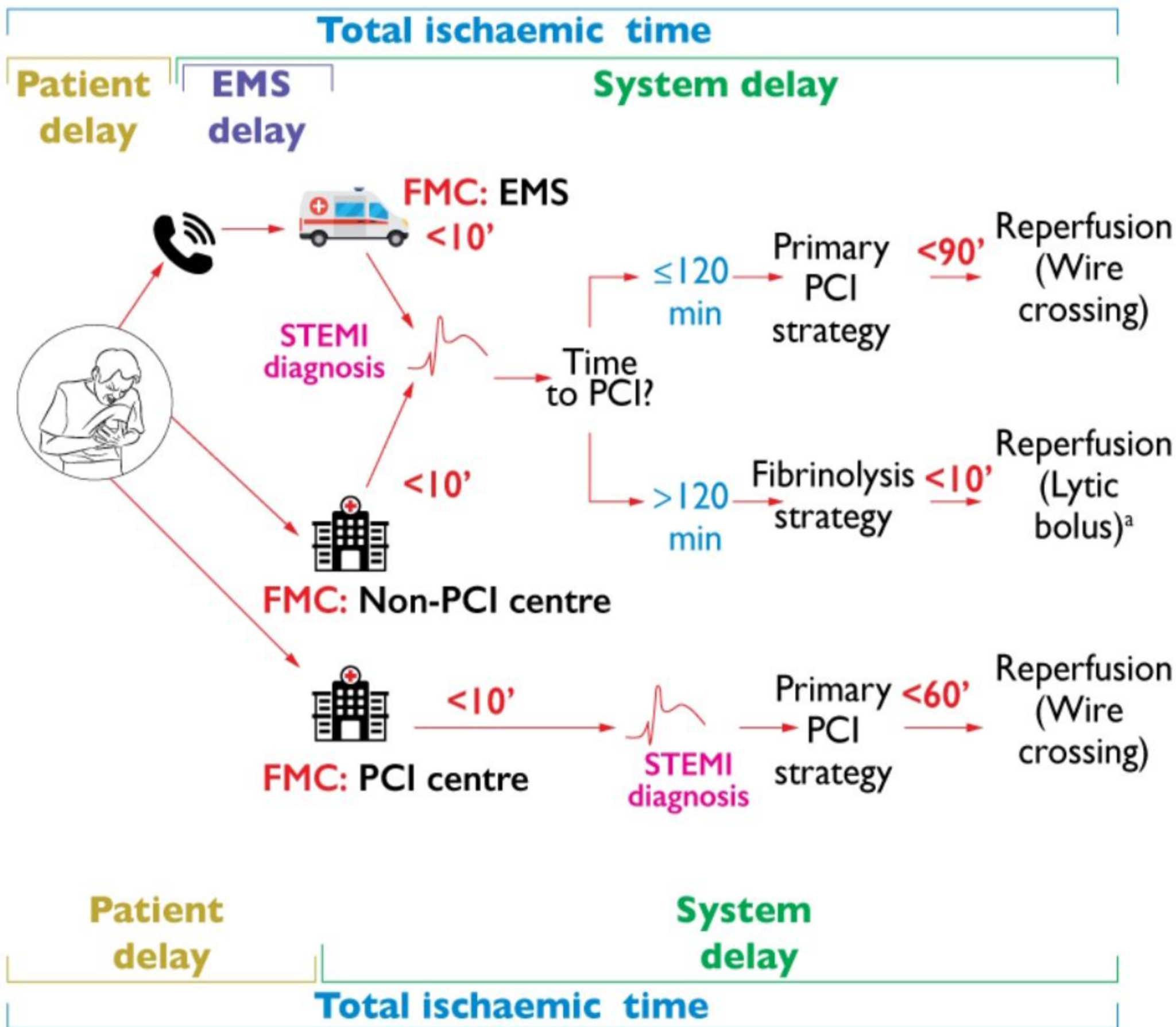
| Intervals                                                                                                                                                                                                    | Time targets |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| Maximum time from <u>FMC</u> to <u>ECG</u> and diagnosis <sup>a</sup>                                                                                                                                        | ≤10 min      |
| Maximum expected delay from <u>STEMI</u> diagnosis to primary <u>PCI</u> (wire crossing) to choose primary <u>PCI</u> strategy over fibrinolysis (if this target time cannot be met, consider fibrinolysis). | ≤120 min     |
| Maximum time from <u>STEMI</u> diagnosis to wire crossing in patients presenting at primary <u>PCI</u> hospitals.                                                                                            | ≤60 min      |
| Maximum time from <u>STEMI</u> diagnosis to wire crossing in transferred patients.                                                                                                                           | ≤90 min      |
| Maximum time from <u>STEMI</u> diagnosis to bolus or infusion start of fibrinolysis in patients unable to meet primary <u>PCI</u> target times.                                                              | ≤10 min      |
| Time delay from start of fibrinolysis to evaluation of its efficacy (success or failure).                                                                                                                    | 60–90 min    |
| Time delay from start of fibrinolysis to angiography (if fibrinolysis is successful).                                                                                                                        | 2–24 hours   |

ECG = electrocardiogram; FMC = first medical contact; PCI = percutaneous coronary intervention;

STEMI = ST-segment elevation myocardial infarction

<sup>a</sup>ECG should be interpreted immediately.

**Figure 2 Modes of patient presentation, components of ischaemic time and flowchart for reperfusion strategy selection**



شفنا سابقا ان مريض STEMI هيمشي على Initial Management فهاخد Loading dose من الاسبرين (325mg-162) O2 لو كان ال saturation اقل من 90%  
وممكن يحتاج Nitroglycerin / Morphine  
وبعد هيك حددنا طريقه ال Reperfusion سواء هيعمل PCI او هياخد Thrombolytic

□ What is the Next Step

مريض ال STEMI هياخد حاجتين أساسيتين قبل أو اثناء ال : Reperfusion strategy

□ Loading dose ( L.D) From Dual Anti platelet Therapy ( DAPT)  
Aspirin +One of the P2Y12 Receptor Antagonist

□ Anticoagulant

هنبداً بهلبوست ال Anti platelet Therapy في مريض ال STEMI بشئ من التفصيل ..

هنقسم المرضى لأربع أقسام ونشوف anti platelet therapy لكل حالة :

1□ If Patient will Undergo PCI

2□ If patient Will Receive Thrombolytic ttt

3□ If patient take Thrombolytic and will Undergo to PCI

4□ patient treated medical only with no Reperfusion strategy

□□□□□□□□□□□□□□□□

1□ اول حالة لو مريض ال STEMI هيعمل PCI :

2□ حسب ال ACC/AHA هياخد L.D من الاسبرين بجرعة 325mg-162 + هنضيف للاسبرين واحد من ال P2Y12 Blocker

اللي هم 3

Clopidogrel (Plavix®): 600mg□

□ Prasugrel (Effient®): 60mg

□ Ticagrelor : 180mg

والتلاتة يعتبرو

class 1 Recommendation

4□ أما حسب ال ESC فال First choice هو استخدام ال Prasugrel او ال ticagrelor مع الاسبرين

ولو مش متوفرين او استخدامهم ممنوع فبنلجأ لل Clopidogrel ...



٤٩ او لو المريض اللي هيعمل PCI كان ماشي على oral anticoagulant مثلا كان مريض A.F فبهلحالة بياخد DAPT اللي هو اسبرين و clopidogrel وممنوع ياخذ ticagrelor او Prasugrel ...

٥٠ بعد ال PCI المريض على شو هيكمل Maintenance وقديش الفترة اللي هيضل ماشي فيها على ?? DAPT

According to ACC /AHA

٥١ ال ticagrelor يفضل عن ال Clopidogrel ك maintenance في المريض اللي عمل PCI وركب دعامات

٥٢ وال Prasugrel يفضل ك maintenance في المريض اللي ركب دعامات ومعدوش High bleeding risk ولا Hx of stroke ولا عنده TIA

جرعات ال maintenance

Clopidogrel (Plavix®) 75 mg once daily

ticagrelor : 90 mg Twice Daily

Prasugrel : 10 mg Once daily

لو وزن المريض اقل من 60 كيلو فجرعه ال Prasugrel بتكون 5mg مرة يوميا ويفضل البعد عن ال Prasugrel لو كان عمر المريض 75 سنة فما فوق وغير مفضل بهلحالة استخدام ال prasugrelol ..

هيكمل لمدة 12 شهر على ال DAPT وبعدها هيكمل بس على اسبرين بجرعة 75-100mg (ويُفضل 81mg ) طول العمر ..

□□□□□□□□□□□□□□□□

٥٣ 2 تاني حالة لو مريض STEMI وهاخد Thrombolytic ..

٥٤ حسب ال ACC/AHH /ESC

هاخد L.D من الاسبرين + Clopidogrel L.D

فالمفضل هنا من ال P2Y12 inhibitor هو ال clopidogrel

بجرعة 300mg لو كان عمر المريض 75 سنة او أقل

اما لو كان عمر المريض اكثر من 75 سنة فجرعة ال Clopidogrel هتكون 75mg

٥٥ اما ال UK national Institute

The UK National Institute for Health and Care Excellence recommends the following:

□ Ticagrelor, in combination with aspirin, unless the patient has a high bleeding risk

□ Clopidogrel, in combination with aspirin, or aspirin alone for patients with a high bleeding risk

وهيكمل Maintenance على ال Plavix بجرعة 75mg يوميا

٤١ حسب ال ESC هيستمر على ال Maintenance plavix لمدة سنة

٤٢ اما ال ACC/AHA هيستمر المريض ع plavix حسب ال

Bleeding / ischemia Risk

فأقل مدة لل Maintenance هي 14 يوم

اما لو ما في bleeding risk فهيستمر لمدة سنة

هنوقف لحد هنا ونكمل اخر حالتين البوست القادم ان شاء الله

#لعلي\_أفيدك ٤٣

# Dual Antiplatelet Therapy (DAPT) In STEMI Patient ....

In Patient will  
undergo PCI Strategy

- Initial: Give loading Dose of aspirin (162 - 325mg)

Plus one of the following

- Prasugrel : 60mg
- or
- Ticagrelor : 180mg
- Clopidogrel : 600mg

according to ESC the  
Preferred is Prasugrel or ticagrelor  
Unless the patient who receive  
oral anticoagulant in which  
clopidogrel will be the preferred  
option.

## ● Maintenance

Continue on DAPT for  
12 month unless contraindicated

- aspirin : 75-100mg (long life)
- Plus one of the following:
- Ticagrelor : 90mg twice
- Prasugrel : 10mg once  
(5mg if Age > 75 or wt < 60kg)
- Clopidogrel : 75mg once

according to ACC/AHA

- Ticagrelor is preferred over clopidogrel in  
Pt with stent implantation

- Prasugrel is preferred over clopidogrel  
in Pt with low bleeding Risk and without Hx of  
Stroke or TIA

In Patient will  
receive thrombolytic

## ● Initial

Give loading dose of  
Aspirin: 162 - 325mg

Plus :

- Clopidogrel : 300mg  
if Age ≤ 75
- or 75mg if Age > 75

according to UKNI

- Ticagrelor can be given  
as loading dose with aspirin  
unless patient has high  
bleeding Risk

## ● Maintenance

- Clopidogrel : 75mg once  
Plus Aspirin : 75-100mg  
for minimum 14 day  
up to 1 year in  
Absence of bleeding  
then continue  
with Aspirin life long

Hadeel Hlayel

Maintenance after STEMI in patient receiving Oral Anticoagulant

- Triple therapy (oral anticoagulation, aspirin and clopidogrel) should be considered for 6 months. Then, oral anticoagulation plus aspirin or clopidogrel should be considered for additional 6 months.
- After 1 year it is indicated to maintain only oral anticoagulation.

خلصنا البوست السابق ال DAPT في المريض اللي هيعمل PCI والمريض اللي هياخد Thrombolytic ...  
بيضل عنا حالتين :

□ If patient take Thrombolytic and will Undergo to PCI

□ لو ال STEMI Pt اخد Thrombolytic وبعدها هيعمل PCI  
هيمشي Loading dose من ال DAPT كالتالي :  
بالنسبة لل Aspirin فهيكثي بال L.D اللي أخذها قبل ال Thrombolytic

أما بالنسبة لل P2Y12 Inhibitor ↓

1□ لو المريض اخد Clopidogrel L.D مع ال Thrombolytic  
فهيكثي بال L.D اللي اخده وهيعمل PCI بدون Loading

2□ لو المريض ما اخد Clopidogrel L.D مع ال Thrombolytic  
وهيعمل PCI خلال اقل من 24 ساعه Thrombolytic Receiving  
فهياخد L.D من ال Clopidogrel بجرعة 300mg قبل ال PCI

3□ لو المريض ما أخذ Clopidogrel L.D مع ال Thrombolytic وهيعمل PCI بعد 24 من ال Thrombolytic Receiving  
فهياخد Clopidogrel بجرعة 600mg قبل ال PCI

□ وفي خيار ثاني Class 2 Recommendation انه ممكن ياخد prasugrel بجرعة 60mg قبل او اثناء ال PCI  
في حال ما كان ماخد L.D ويكون عدى اكثر من 24 ساعه من اخده ل  
Fibrin specific Thrombolytic as Alteplase ,tenecteplase

او اكثر من 48 ساعه من اخده ل Non fibrin specific thrombolytic زي ال Streptokinase

□ وبعدها هيكمل المريض maintenance على DAPT ↓ ↓ :

□ لو كان مركب دعامة من نوع ( Drug-eluting stent ( DES فهيكمل على Plavix 75mg مرة يوميا  
( class 1 Recommendation )  
لمدة سنة على الاقل

او يكمل على Prasugrel بجرعه ↓ 10mg  
( class 2a Recommendations )  
لمدة سنة على الاقل

□ لو كان مركب دعامة من نوع (bare-metal stent (BMS

فیکمل بردو ع (Plavix ( class 1 او prasugrel ( class2.a)

For 1 month at least and up to 1 year

❓ اما بالنسبة لل Ticagrelor ك Maintenance فهو برده

## class 2a Recommendations

[illegible]

□ If patient treated medical only with no Reperfusion strategy

Plavix L.D أو Ticagrelor L.D + L.D من الاسبرين

Ticagrelor 180mg والمفضل هو

We prefer ticagrelor to clopidogrel; prasugrel has not been shown to be superior to clopidogrel in patients managed medically following acute coronary syndrome

ويستمر على DAPT من شهر ل 12 شهر حسب ال Bleeding Risk

□ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □

نختم المنشور بموانع استخدام ال Prasugrel وال Ticagrelor

Do not use either ticagrelor or prasugrel in patients who:

- Have a history of haemorrhagic stroke

☐ Have moderate to severe liver disease

☐ Are already taking chronic oral anticoagulation.

□Prasugrel is also Contraindicated in patients with previous stroke or transient ischaemic attack

□ Prasugrel Not generally recommended in patients aged  $\geq 75$  years or those with body weight  $< 60$  kg

If prasugrel is recommended by the interventional cardiology team for these patient groups, then a lower maintenance dose is advised

#لعلی أفیدك ؟



**Recommendations for Duration of DAPT in Patients With ACS Treated With Medical Therapy Alone**

| Recommendation                                                                                                                                                                                                                                         | <u>COR</u> | <u>LOE</u>  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-------------|
| In patients with ACS who are managed with medical therapy alone (without revascularization or fibrinolytic therapy) and treated with DAPT, P2Y <sub>12</sub> inhibitor therapy (clopidogrel or ticagrelor) should be continued for at least 12 months. | <b>I</b>   | <b>B-R</b>  |
| In patients treated with DAPT, a daily aspirin dose of 81 mg (range, 75 mg to 100 mg) is recommended.                                                                                                                                                  | <b>I</b>   | <b>B-NR</b> |

**P2Y<sub>12</sub> receptor inhibitors****Loading doses**

*For patients who received a loading dose of clopidogrel with fibrinolytic therapy:*

- Continue clopidogrel 75 mg daily without an additional loading dose

**I****C**

*For patients who have not received a loading dose of clopidogrel:*

- If PCI is performed ≤24 h after fibrinolytic therapy: clopidogrel 300-mg loading dose before or at the time of PCI

**I****C**

- If PCI is performed >24 h after fibrinolytic therapy: clopidogrel 600-mg loading dose before or at the time of PCI

**I****C**

- If PCI is performed >24 h after treatment with a fibrin-specific agent or >48 h after a non-fibrin-specific agent: prasugrel 60 mg at the time of PCI

**IIa****B**

*For patients with prior stroke/TIA: prasugrel*

**III:  
Harm****B**

## Maintenance doses and duration of therapy

*DES placed: Continue therapy for at least 1 y with:*

• Clopidogrel: 75 mg daily

**I**

**C**

• Prasugrel: 10 mg daily

**IIa**

**B**

*BMS\* placed: Continue therapy for at least 30 d and up to 1 y with:*

• Clopidogrel: 75 mg daily

**I**

**C**

• Prasugrel: 10 mg daily

**IIa**

**B**

ال Cangrelor واحد من ال P2Y12 Inhibitor اللي يتاخذ I.V ..  
متى ممكن نلجأ لل .. Cangrelor □

□Cangrelor may be considered if the patient either has not yet received a loading dose of an oral P2Y12 inhibitor at the time primary PCI starts or is unable to ingest an oral drug.

□Sometimes used in STEMI patients in cardiogenic shock and/or when oral administration of a P2Y12 inhibitor is difficult

حسب ال ESC فاستخدام ال Cangrelor يعتبر class 2b

جرعته :

Percutaneous coronary intervention: IV: 30 mcg/kg bolus prior to percutaneous coronary intervention (PCI) followed immediately by an infusion of 4 mcg/kg/minute continued for at least 2 hours or for the duration of the PCI, whichever is longer

لو بعدها المريض هيتشف ع Oral P2Y12 Inhibitor

□لو هنمشيه ع clopidogrel , فهاخد المريض 600mg بعد ما يتوقف ال Cangrelor Infusion مباشرة

□.Do not administer clopidogrel prior to cangrelor discontinuation□

□لو هيمشي ع Ticagrelor , فهاخد Tica بجرعة 180mg

خلال ال Cangrelor Infusion او بعد ايقاف ال Cangrelor مباشرة

□ اما لو هيمشي ع Preasugrel فهاخد 60mg بعد ايقاف ال Cangrelor Infusion

وبردو زيه زي ال Plavix ممنوع يتاخذ قبل ما يتوقف ال Cangrelor infusion

#لعلي\_أفيدك □



NDC 10122-620-10

**KENGREAL**  
(cangrelor) for injection  
50 mg per vial

**Chiesi**

Rx Only  
10 Single Use Vials  
For Intravenous Use Only

Store at 20-25° C (68-77° F)  
Excursions 15-30° C permitted  
[USP controlled room temperature]

Must be reconstituted and diluted prior to use.  
Reconstitution: Add 5 mL of Sterile Water for Injection, USP to the vial.

Usual dose: See package insert for dosing information.

NDC 10122-620-01

**KENGREAL**

(cangrelor) for injection

50 mg per vial

Rx Only  
Single Use Only  
For Intravenous Use Only

(CARDIOLOGY\_79 □ #ACS\_7 #STEMI #DAPT( Last part#

Glycoprotein 2b/3a اسمه receptor عليه platelet سطح ال  
GP 2b/3a

لما يتأكتف يبحفز ال platelet aggregation

ففي أدية بتثبط هاد ال receptor ويتمنع ال  
platelet aggregation

وفعالياتها في تثبيط ال Platelet aggregation بتوصل ل 80%

لكن مشكلتها High bleeding Risk □ و بيعملو thrombocytopenia ...

من أمثلة ال GP2b/3a Inhibitor ↓

abciximab, eptifibatide, and tirofiban

□□□□□□□□□□□□□□□□

متى بنستخدم ال GP2b/3a Inhibitor لمريض ال STEMI

selected patients who may benefit from GP IIb/IIIa inhibitors include

□ Patients who either have not received pretreatment with a P2Y12 receptor blocker or for whom the duration between P2Y12 inhibitor administration and PCI is short (<30 to 45 minutes)

□ Other patients undergoing primary PCI who might benefit from a GP IIb/IIIa inhibitor include those who are found to have no or slow reflow, large thrombus burden, or intraprocedural bailout for .distal embolization, coronary artery dissection, or hemodynamic instability

□□□□□□□□□□□□□□□□

الجرعات :

Abciximab :

0.25 mg/kg bolus administered at the time of PCI, followed by an infusion of 0.125 mcg/kg/minute (maximum: 10 mcg/minute) continued for up to 12 hours

Eptifibatide :

Bolus of 180 mcg/kg (maximum: 22.6 mg) beginning after diagnostic coronary angiography, just before PCI, followed by a continuous infusion of 2 mcg/kg/minute (maximum: 15 mg/hour); a second bolus of 180 mcg/kg (maximum: 22.6 mg) should be administered 10 minutes after the first bolus; continue infusion for up to 18 to 24 hours after PCI

Tirofiban :

Loading dose: 25 mcg/kg administered over ≤5 minutes beginning after diagnostic coronary angiography, just before PCI; maintenance infusion: 0.15 mcg/kg/minute continued for up to 18 hours

ال Tirofiban وال Eptifibatide يحتاجو renal dose adjust في ال CKD ( مرفق مع الصور )





GP IIb/IIIa inhibitors should be  
.....  
considered for bailout if there is  
evidence of no-reflow or a throm-  
botic complication.

**Ila**

**C**

| Abciximab                                                                               |                                                                                                                                                                                               |
|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Normal renal function and stage 1–3 CKD<br>(eGFR $\geq 30$ mL/min/1.73 m <sup>2</sup> ) | Bolus of 0.25 mg/kg <i>i.v.</i> followed by 0.125 µg/kg/min infusion (maximum 10 µg/min).                                                                                                     |
| Stage 4 CKD<br>(eGFR 15 to <30 mL/min/1.73 m <sup>2</sup> )                             | Careful consideration of bleeding risk                                                                                                                                                        |
| Stage 5 CKD<br>(eGFR <15 mL/min/1.73 m <sup>2</sup> )                                   | Careful consideration of bleeding risk                                                                                                                                                        |
| Eptifibatide                                                                            |                                                                                                                                                                                               |
| Normal renal function and stage 1–3 CKD<br>(eGFR $\geq 30$ mL/min/1.73 m <sup>2</sup> ) | Bolus <sup>a</sup> of 180 µg/kg <i>i.v.</i> followed by an infusion of 2.0 µg/kg/min for up to 18 hours.<br><br>If eGFR <50 mL/min/1.73 m <sup>2</sup> reduce infusion dose to 1.0 µg/kg/min. |
| Stage 4 CKD<br>(eGFR 15 to <30 mL/min/1.73 m <sup>2</sup> )                             | Not recommended                                                                                                                                                                               |
| Stage 5 CKD<br>(eGFR <15 mL/min/1.73 m <sup>2</sup> )                                   | Not recommended                                                                                                                                                                               |
| Tirofiban                                                                               |                                                                                                                                                                                               |
| Normal renal function and stage 1–3 CKD<br>(eGFR $\geq 30$ mL/min/1.73 m <sup>2</sup> ) | Bolus 25 µg/kg <i>i.v.</i> followed by 0.15 µg/kg/min.                                                                                                                                        |
| Stage 4 CKD<br>(eGFR 15 to <30 mL/min/1.73 m <sup>2</sup> )                             | Reduce infusion rate to 50%                                                                                                                                                                   |
| Stage 5 CKD<br>(eGFR <15 mL/min/1.73 m <sup>2</sup> )                                   | Not recommended                                                                                                                                                                               |

□ If pt will Undergo PCI

وجرعته بتعتمد على حسب هل المريض اخذ أحد أدوية مجموعة ال GP2b/3a inhibitor مع الاسبرين ك DAPT ولا لأ ؟

.50-70 IU/kg i.v. bolus with GP IIb/IIIa inhibitors

.0.75 mg/kg iv. bolus followed by i.v. infusion of 1.75 mg/kg/hour for up to hours after the procedure

بجرعة

0.5mg/kg/I.V bolus

□ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □

: ☐ If pt will Receive Thrombolytic Or will not receive Reperfusion Therapy

### Class 1 Recommendation

لكن الأفضلية للـ Enoxaparine

بشرط يكون المريض أخذ Streptokinase ك Thrombolytic

Enoxaparine dose : □

30 mg i.v. bolus followed 15 min later by 1 mg/kg s.c. every 12 hours until revascularization or hospital discharge for a maximum of 8 days. The first two s.c. doses should not exceed 100 mg per injection.

In patients  $\geq 75$  years of age:

No i.v. bolus; start with first s.c. dose of 0.75 mg/kg with a maximum of 75 mg per injection for the first two s.c. doses.

In patients with eGFR <30 mL/min/1.73 m<sup>2</sup>, regardless of age, the s.c. doses are given once every 24 hours..

□UFH

60 IU/kg i.v. bolus with a maximum of 4000 IU followed by an i.v. infusion of 12 IU/kg with a maximum of 1000 IU/hour for 24-48 hours.

Target aPTT: 50-70 s or 1.5 to 2.0 times that of control to be monitored at 3, 6, 12 and 24 hours.

□Fondaparinux

.2.5 mg i.v. bolus followed by a s.c. dose of 2.5 mg once daily up to 8 days or hospital discharge

#لعللي أفيدك ؟



# All STEMI patient should Receive Anticoagulant therapy In addition to Antiplatelet therapy :

anticoagulant in  
Pt will undergo PCI

- UFH is the first choice

Dose • 70-100 IU/kg I.V bolus  
when no Gp2b/3a<sup>⊖</sup> is planned

• 50-70 IU/kg I.V bolus  
with Gp2b/3a<sup>⊖</sup>

- In pt with heparin Induce  
thrombocytopenia

bivalirudin is Recommended  
as first choice

• 0.75 mg/kg I.V bolus followed  
by I.V Infusion of 1.75 mg/kg/hr  
for up to hour after the procedure

- Enoxaparin can be used (class 2a)

• 0.5 mg/kg I.V bolus

- Fondaparinux  
Not Recommended

" ↑ Risk of stent  
thrombosis)

Hadeel Hlaith  
20/5/2022

Source: ESC

anticoagulant in  
Pt will Receive  
thrombolytic

- ~~UFH~~ enoxaparin  
or UFH  
- Fondaparinux can used  
only with streptokinase

Doses :

• Enoxaparin

• In pt < 75 year of Age:

30 mg I.V bolus followed 15 min

Later by 1 mg/kg S.C every 12 hr  
until Revascularization or hospital  
discharge for a maximum 8 day  
the first two S.C doses shouldn't  
exceed 100 mg per Injection

• In patient ≥ 75 year of Age

- No I.V bolus, start with 1<sup>st</sup> S.C  
dose of 0.75 mg/kg

(max: 75 mg per Injection in first 2, S.C)

• UFH

60 IU/kg I.V bolus (max: 4000 I.U)

followed by Infusion 12 I.U/kg

(max: 1000 I.U/hr for 24-48 hr)

APTT target: 50-70s

• Fondaparinux (only with streptokinase)

2.5 mg I.V bolus follow by 2.5 mg S.C once  
daily up to 8 day or hospital discharge.

**Enoxaparin**

Normal renal function  
and stage 1–3 CKD  
(eGFR  $\geq 30$   
mL/min/1.73 m<sup>2</sup>)

1 mg/kg s.c. twice a day,  
0.75 mg/kg s.c. twice daily in pa-  
tients  $\geq 75$  years old.

Stage 4 CKD  
(eGFR 15 to  $<30$   
mL/min/1.73 m<sup>2</sup>)

1 mg/kg s.c. once a day

Stage 5 CKD  
(eGFR  $<15$   
mL/min/1.73 m<sup>2</sup>)

Not recommended



**UFH**

Normal renal function  
and stage 1–3 CKD

(eGFR  $\geq 30$   
mL/min/1.73 m<sup>2</sup>)

*Before coronary angiography:*

Bolus 60–70 IU/kg *i.v.* (maximum 5000 IU) and infusion (12–15 IU/kg/hour, maximum 1000 IU/hour), target aPTT 1.5–2.5 x control.

*During PCI:*

70–100 IU/kg *i.v.* (50–70 IU/kg if concomitant with GP IIb/IIIa inhibitors).

Stage 4 CKD

(eGFR 15 to  $<30$   
mL/min/1.73 m<sup>2</sup>)

No dose adjustment

Stage 5 CKD

(eGFR  $<15$   
mL/min/1.73 m<sup>2</sup>)

No dose adjustment



## Renal dysfunction



### Fondaparinux

Normal renal function  
and stage 1–3 CKD

(eGFR  $\geq 30$   
mL/min/1.73 m<sup>2</sup>)

2.5 mg s.c. once a day.

Stage 4 CKD

(eGFR 15 to  $<30$   
mL/min/1.73 m<sup>2</sup>)

Not recommended

if eGFR  $<20$  mL/min/1.73 m<sup>2</sup> or  
dialysis

Stage 5 CKD

(eGFR  $<15$   
mL/min/1.73 m<sup>2</sup>)

Not recommended

**Routine post-procedural anticoagulation is not required after primary PCI unless there is a separate indication for it, for example: [4]**

- Full-dose anticoagulation:
  - Atrial fibrillation
  - Mechanical heart valve
  - Left ventricular thrombus
- Prophylactic-dose anticoagulation:
  - Patients at high risk of venous thromboembolism

زي ما شفنا سابقا انه ال Fibrinolytic خيار لل Reperfusion  
 في حال انه مريض ال STEMI وصل لمستشفى ما فيها primary PCI center وعشان يتنقل لمكان فيه primary PCI  
 هيجتاج اكثر من 120 دقيقة

❓ فبنلجأ لل Fibrinolytic خلال 10 دقائق من التشخيص لو لسه معداش 12hr على ال Symptom ...

❓ في بعض المرضى بيكون عندهم موانع لاستخدام ال Fibrinolytic strategy  
 ففي بيكونو Absolute Contraindicated وفي بيكونو ... relative contraindicated

□ Absolute Contraindication :

- Previous intracranial haemorrhage or stroke of unknown origin at anytime.
- Ischaemic stroke in the preceding 6 months.
- Central nervous system damage or neoplasms or arteriovenous malformation.
- Recent major trauma/surgery/head injury (within the preceding month).
- Gastrointestinal bleeding within the past month.
- Known bleeding disorder (excluding menses).
- Aortic dissection.
- Non-compressible punctures in the past 24 hours (e.g. liver biopsy, lumbar puncture).

□ Relative Contraindication :

- Transient ischaemic attack in the preceding 6 months.
- Oral anticoagulant therapy.
- Pregnancy or within 1 week postpartum.
- Refractory hypertension (SBP >180 mmHg and/or DBP >110 mmHg).
- Advanced liver disease.
- Infective endocarditis.
- Active peptic ulcer.
- Prolonged or traumatic resuscitation

شوهي أنواع ال Fibrinolytic

fibrin-specific drug such as alteplase or tenecteplase. هاهي الادويه بتروح تكسر الfibrin الموجود في الجلطة

Non-fibrin-specific drug as Streptokinase

بيكسر ال Fibrin اللي موجود بال Thrombous والموجود بالدم فعشان هيك اله High Bleeding Risk ...

لازم متابعه ال Bp لو قل ال Bp فبنقل ال Infusion rate ولو قل بدرجة كبيره بيتوقف ال Infusion لحد ما يتحسن الضغط بعدها بنكمل ال Infusion

في تحليل ال Vial الستيرويد، ال Saline لازم ننزله من على جدران ال Vial ومبفعش ينهز جامد، بس بنكتفي بدرجة خفيفه عشان نحافظ على ال Efficacy

ال Streptokinase يستخدم لمرة واحدة فقط ، فالمرضى اللي سبق وأخذ Streptokinase مش هينفع ياخده مرة ثانية لانه بيكون الجسم عمل تكوين ل Antibody ضده ..

الجرعات مرفقه مع الصور

#لعلي\_أفيدك

Doses of fibrinolytic agents and antithrombotic co-therapies are listed in Table 7.

| Table 7 Doses of fibrinolytic agents and antithrombotic co-therapies |                                                                                                                                                                                                                                                                              |                                                       |
|----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| Drug                                                                 | Initial treatment                                                                                                                                                                                                                                                            | Specific contra-indications                           |
| <b>Doses of fibrinolytic therapy</b>                                 |                                                                                                                                                                                                                                                                              |                                                       |
| Streptokinase                                                        | 1.5 million units over 30–60 min <u>i.v.</u>                                                                                                                                                                                                                                 | Previous treatment with streptokinase or anistreplase |
| Alteplase ( <u>tPA</u> )                                             | 15 mg <u>i.v.</u> bolus<br>0.75 mg/kg <u>i.v.</u> over 30 min (up to 50 mg) then 0.5 mg/kg <u>i.v.</u> over 60 min (up to 35 mg)                                                                                                                                             |                                                       |
| Reteplase ( <u>rPA</u> )                                             | 10 units + 10 units <u>i.v.</u> bolus given 30 min apart                                                                                                                                                                                                                     |                                                       |
| Tenecteplase (TNK- <u>tPA</u> )                                      | Single <u>i.v.</u> bolus:<br>30 mg (6000 IU) if <60 kg<br>35 mg (7000 IU) if 60 to <70 kg<br>40 mg (8000 IU) if 70 to <80 kg<br>45 mg (9000 IU) if 80 to <90 kg<br>50 mg (10000 IU) if ≥ 90 kg<br><br>It is recommended to reduce to half-dose in patients ≥75 years of age. |                                                       |

**Table 8 Contra-indications to fibrinolytic therapy**

**Absolute**

Previous intracranial haemorrhage or stroke of unknown origin at anytime.

Ischaemic stroke in the preceding 6 months.

Central nervous system damage or neoplasms or arteriovenous malformation.

Recent major trauma/surgery/head injury (within the preceding month).

Gastrointestinal bleeding within the past month.

Known bleeding disorder (excluding menses).

Aortic dissection.

Non-compressible punctures in the past 24 hours (e.g. liver biopsy, lumbar puncture).

**Relative**

Transient ischaemic attack in the preceding 6 months.

Oral anticoagulant therapy.

Pregnancy or within 1 week postpartum.

Refractory hypertension (SBP >180 mmHg and/or DBP >110 mmHg).

Advanced liver disease.

Infective endocarditis.

Active peptic ulcer.

Prolonged or traumatic resuscitation.

AV = arteriovenous; DBP = diastolic blood pressure; SBP = systolic blood pressure.



عند تحليل vial ال Streptokinase ما بنفع ابدأ  
يتكون أي فقاعات أثناء التحليل والا هيفقد ال  
efficacy بتاعته  
فلما هيتحل ب saline , لازم ننزل ال saline على  
جدار ال vial وبالراحة ولما يترج يكون rolling مش  
هز عنيف



مجرد ظهور فقاعات معناها فقد  
فعاليتها

البوست الأخير في ال STEMI

Other Medications for STEMI Pt ;

: 1 Beta Blocker

Contraindicated .. حسب ال American Guidelines أول 24 ساعه لازم المريض يبدأ BB ويستمر عليه ما لم يكن ..

Metoprolol tartrate 25 to 50 mg every 6 to 12 h orally, then transition over next 2 to 3 d to twice-daily dosing of metoprolol tartrate or to daily metoprolol succinate; titrate to daily dose of 200

Carvedilol 6.25 mg twice daily, titrate to 25 mg twice daily as tolerated

ال BB ممكن يتاخذ I.V في حالات ال hypertensive or ongoing ischemia

Metoprolol tartrate IV 5 mg every 5 min as tolerated upto 3 doses; titrate to heart rate and BP

BB contraindication ( heart failure, low output state, hypotension, bradycardia, heart block, STEMI precipitated by cocaine use )

ESC : recommend BB oral therapy for patients with STEMI with heart failure and/or left ventricular ejection fraction (LVEF)  $\leq 40\%$  (ESC Class I, Level A)

ACEIs /ARBs

2 ACEIs /ARBs

For patients with anterior infarction, post-MI LV systolic dysfunction (EF  $\leq 0.40$ ) or HF ( class 1 Recommendation )

• May be given routinely to all patients without contraindication ( class 2a Recommendation )

Lisinopril 2.5 to 5 mg/d to start; titrate to 10 mg/d or higher as tolerated

Captopril 6.25 to 12.5 mg 3 times/d to start; titrate to 25 to 50 mg 3 times/d as tolerated

Ramipril 2.5 mg twice daily to start; titrate to 5 mg twice daily as tolerated

Trandolapril test dose 0.5 mg; titrate up to 4 mg daily as tolerated

لو المريض كان Intolerated لل ACEIs مثلا صار عنده dry cough

فيبتشف ل ARBs

Valsartan 20 mg twice daily to start; titrate to 160 mg twice daily as tolerated

□□□□□□□□□□□□□□□□

### 3□Aldosterone antagonists :

recommended unless contraindicated for patients

with STEMI, LVEF < 40%, either symptomatic heart failure or diabetes mellitus, and already receiving ACE inhibitor and beta-blocker (ACCF/AHA Class I, Level B; ESC Class I, Level B)

□□□□□□□□□□□□□□□□

### 4□High-intensity statin

recommended for all patients with STEMI and no contraindications (ACCF/AHA Class I, Level B; ESC Class I, Level A);

statin use within first 24 hours associated with lower in-hospital mortality and fewer early complications

R/Atorvastatin 40-80 mg od or Rosuvastatin 20-40 mg od

□□□□□□□□□□□□□□□□

5□R/Isosorbide mononitrate (od for SR tablets, or bid for short acting tablets with 8h interval in .(between

.. Nitrate فيباخذ Chest pain عنده المريض ضايل

هيك بنكون خلصنا ال STEMI بفضل رب العالمين ٤

"وَآخِرُ دَعْوَاهُمْ أَنِ الْحَمْدُ لِلَّهِ رَبِّ الْعَالَمِينَ"

#لعلي\_أفيدك ٤



## Therapy

### Beta-Receptor Antagonists



#### Indications

- Oral: All patients without contraindication
- IV: Patients with refractory hypertension or ongoing ischemia without contraindication

#### Dose/ Administration

Individualize:

- Metoprolol tartrate 25 to 50 mg every 6 to 12 h orally, then transition over next 2 to 3 d to twice-daily dosing of metoprolol tartrate or to daily metoprolol succinate; titrate to daily dose of 200 mg as tolerated
- Carvedilol 6.25 mg twice daily, titrate to 25 mg twice daily as tolerated
- Metoprolol tartrate IV 5 mg every 5 min as tolerated up to 3 doses; titrate to heart rate and BP





## Therapy

ACE Inhibitors



### Indications

- For patients with anterior infarction, post-MI LV systolic dysfunction (EF  $\leq 0.40$ ) or HF
- May be given routinely to all patients without contraindication

### Dose/ Administration

Individualize:

- Lisinopril 2.5 to 5 mg/d to start; titrate to 10 mg/d or higher as tolerated
- Captopril 6.25 to 12.5 mg 3 times/d to start; titrate to 25 to 50 mg 3 times/d as tolerated
- Ramipril 2.5 mg twice daily to start; titrate to 5 mg twice daily as tolerated
- Trandolapril test dose 0.5 mg; titrate up to 4 mg daily as tolerated

### Avoid/ Caution

- Hypotension
- Renal failure
- Hyperkalemia



## Therapy

ARB



### Indications

- For patients intolerant of ACE inhibitors

### Dose/ Administration

- Valsartan 20 mg twice daily to start; titrate to 160 mg twice daily as tolerated

### Avoid/ Caution

- Hypotension
- Renal failure
- Hyperkalemia





## Therapy

Statins



### Indications

- All patients without contraindications

### Dose/ Administration

- High-dose atorvastatin 80 mg daily

### Avoid/ Caution

- Caution with drugs metabolized via *CYP3A4*, fibrates
- Monitor for myopathy, hepatic toxicity
- Combine with diet and lifestyle therapies
- Adjust dose as dictated by targets for LDL cholesterol and non-HDL cholesterol reduction



## Therapy

Nitroglycerin



### Indications

- Ongoing chest pain
- Hypertension and HF

### Dose/ Administration

- 0.4 mg sublingual every 5 min up to 3 doses as BP allows
- IV dosing to begin at 10 mcg/min; titrate to desired BP effect

### Avoid/ Caution

- Avoid in suspected RV infarction
- Avoid with SBP <90 mm Hg or if SBP >30 mm Hg below baseline
- Avoid if recent (24 to 48 h) use of 5'-phosphodiesterase inhibitors